REMARKS

This Amendment, submitted in response to the Office Action dated July 9, 2003, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

Claims 1-30 remain pending. Claims 3, 5, 7, 18, 20 and 22 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claims 1-8 and 16-23 are rejected under 35 U.S.C. § 102(e) as being anticipated by Wang (U.S. Patent 6,477,262). Claims 9-13 and 24-28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang (U.S. Patent 6,477,262). Applicant amends claims 3, 5, 7, 18, 20 and 22 as set forth above to address the § 112 rejection. Applicant submits that the modifications do not narrow the scope of the claims. Applicant further submits the following arguments in traversal of the prior art rejections.

The present invention relates a radiation-image storing method and a radiation-image storing unit which renders it easier to recognize positional information of areas of interest on an image display unit. Conventionally, CR images in the orthopedic field were used to obtain measurement for scolistic curvature and kyphotic index of a subject. Repetitive filming and measurement of the subject helped judge the effectiveness of a course of treatment. However, when measurements are made based on the radiation image displayed on a display screen, it is not easy to determine accurately which point on the radiation image displayed on the display screen has been measured and what measurement result has been obtained. Particularly, when a doctor or a radiation technician making the present measurement differs from a doctor who made the previous measurement, it is difficult to recognize the previous measuring points and

measurement result. In this case, an accurate comparison between measurement results cannot be performed.

Applicant's invention obviates the deficiency. Referring to an exemplary embodiment as illustrated in Fig. 2, an original radiation image P0 is input to both the overall display means 210 and the enlargement display means 220. The original radiation image P0 input to the overall display means 210 is reduced by the reduction processing means 212 and stored in the first memory 211. The reduced image P0 is displayed as the reduced entire image P1 on half of the area of the display screen. On the other hand, the original radiation image P0 input to the enlargement display means 220 is enlarged by the enlargement processing means 222 and stored in the second memory 221. Cursors C1 and C2 indicate positions in the overall image and the enlarged images, respectively. In the enlarged images P2, P3, a second cursor C2 specifies K1 and K2 as measurement points. A measurement means 250 calculates a distance between measurements K1 and K2.

Specifically, in a first mode set by mode switching means 240, the second cross cursor C2 moves in synchronism with movement of the first cross cursor Cl in the entire image P1. The enlargement display means 220 calculates a point on the enlarged radiation image stored in the second memory 221 which corresponds to the point on the entire image P1 indicated by the first cross cursor Cl, and then displays an area near the calculated point on fractional area of the display screen as the image P2 of a portion enlarged to a size 4 times the original. When the operator moves the first cross cursor Cl on the entire image P1, the enlarged image P2 is scrolled within the display screen for the enlarged image P2 by an amount that is an inverse of the fractional area of the movement amount of the first cross cursor C1, in synchronism with the

movement of the first cross cursor C1. This permits more accurate placement of a selection position for measurement. After selecting first and second measuring points, the operator inputs an instruction to determine a specified measuring point to the enlargement display means 220, manipulating the mouse 241. A similar process is used to set the other measurement point. The measurement means 250 to which the two measuring points K1 and K2 were input calculates a result of measurement, such as a distance between K1 and K2, in accordance with the previously stored algorithm for measurement.

Turning to the cited art, Wang relates the analysis of mammograms based on a computer-calculated probability that an abnormality occurs at a particular position. Referring to FIG. 1, the radiologic image is in the form of a mammographic x-ray film. The original analog two-dimensional mammographic x-ray film 10 is sent through the film digitizer 30 of a CAD (computer-aided diagnosis) system 20 to obtain a digitized two-dimensional mammographic image 40. The digitized mammographic image 40 is sent through an abnormal feature detection stage 50 including an abnormal feature extraction sub-stage 51 and a classifier sub-stage 52. The output of the abnormal feature extraction sub-stage 51 comprises the features and locational information of the detected suspected abnormalities. The output of the classifier sub-stage 52 comprises the probability information of the detected abnormalities. The findings or results from the abnormal feature detection stage 50 are in the form of a two-dimensional annotation map or x-y coordinate information 55 of the locations of the CAD-detected suspected abnormalities with probability values above a certain selected threshold. Fig. 1 illustrates four CAD-detected suspected abnormalities have been found as points 56, 57, 58 and 59 at annotation map 55. The annotation map can be reduced to a miniaturized display output 300.

The Examiner maintains that Wang teaches each feature of claim 1. The rejection is not supportable for at least the following two reasons.

First, the Examiner's analysis comprises a list of elements without considering the inter-relationship of claim elements. Particularly, in making the rejection, the Examiner cites a storage device 70 and an annotation image 55, a miniaturized version thereof 300 and a TV monitor version of the annotated image (400/55). The Examiner cites storage 70 as storing a radiation image. However, the radiation image comprises either the original analog image 10 or the output of a digitizer 14, either of which is placed into a digitized form 40. The digitized image undergoes an analysis to provide an annotation image 55. The annotation image 55 is not a radiation image. For example, annotated image 55 illustrates none of the gradation features characteristic of a radiation image. Similarly, the fact that the annotation 55 is illustrated in conjunction with the light box image (100), TV monitor radiation image (400) or the radiation image printout (500) would indicate that the annotation 55 is not a radiation image, but is only useful in conjunction with the actual radiation image. The breast outline is merely a computer graphic that can be removed from the x-y map of the annotation image. Col. 6, lines 23-27.

Second, as a related matter, claim 1 describes that the radiation image comprises a designated measuring point to measure geometric features of an object included in a radiation image. In Wang, a method of detecting a position of abnormality of the object (cancer) is disclosed. However, Wang is silent about measuring points designed to measure the geometric features, such as the distance, angle and the like between the marked measuring points, unlike the present invention. Further, in Wang, the measuring locations 56-59 are associated with the annotated image 55 which is a result of an extraction and classifier analysis. Accordingly, the

radiation image 40 does not include the measuring points, but rather the purported position information relates to data points separate from the radiation image. Similarly, the position data is stored as part of the annotation rather than the measuring point displayed on the screen being stored with the radiation image. Therefore, the inter-relationships described by claim 1 are not taught by Wang, and claim 1 is patentable for at least these reasons.

Because claim 16 includes features similar to that described in claim 1, claim 16 also is not anticipated for at least these reasons. The remaining claims are patentable based on their dependency.

With further regard to claims 5-6 and 20-21, these claims specifically describe that the positional information and measurement information of a measurement point are embedded with the radiation image in storage. The Examiner cites col. 7 to teach this aspect. However, the cited portion merely describes an alignment of display information. This display information does not dictate how the radiation image, measurement and positional information are stored and does not require the embed features of storage.

With further regard to claims 9-13 and 24-28, these claims describe that the radiation image is an entire image that includes a whole radiation image and an enlarged image of a portion of the entire image. The Examiner cites an unenlarged display and a reduced display output as teaching the features of the claims. However, the claim describes an enlarged image of a portion of the radiation image. The enlargement of the image is what makes it possible to accurately place and measure points of interest in the display. The standard unenlarged image of

Wang does not permit this nor does the reduced image display. Therefore, claims 9-13 and 24-28 are patentable for at least these reasons.

With further regard to claims 14-15 and 29-30, these claims describe an image indicated by an indicating mark. The Examiner maintains that this corresponds to a well known process for marking a region of interest and cites Official Notice. The rejection is not supported for at least two reasons. First, Wang does not describe setting a region of interest but rather relates to a computer-aided calculation of a probability of likelihood of abnormality. This is a fundamentally different approach than identification of region of interest. Second, in view of this object of Wang, Applicant would request the Examiner to cite a reference that is properly combinable with a computer-aided analysis to determine setting of an indicating mark. Claims 14-15 and 29-30 are patentable over the art of record.

Applicant further adds claims 31-33 to describe features of the invention more particularly.

In view of the above, Applicant submits that claims 1-33 are in condition for allowance. Therefore it is respectfully requested that the subject application be passed to issue at the earliest possible time. The Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

Susan Perng Pan
Registration No. 41,239

Reg. no. 38,584

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: November 10, 2003